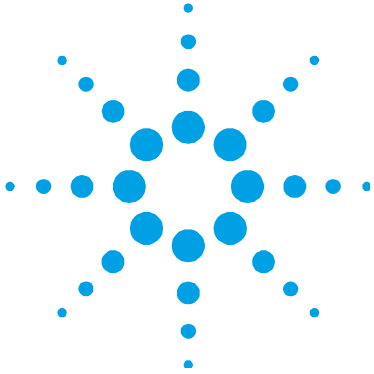

Vaclon Plus 25 Pumps

Triode
911-5030
Diode
911-5036

Manuale di Istruzioni
Bedienungshandbuch
Notice de Mode D'Emploi
User Manual

87-900-063-01 (F)
05/2011

Agilent Technologies

Notices

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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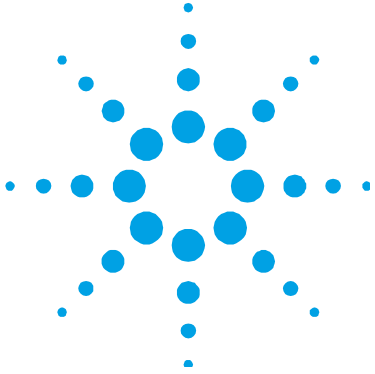

1
Procedura per l'installazione

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Traduzione delle istruzioni originali

Informazioni generali

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Agilent prima dell'utilizzo dell'apparecchiatura. La Agilent si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche.

Le pompe della serie Vaclon Plus sono pompe ioniche utilizzate comunemente per applicazioni di ultra alto vuoto, grazie alla loro pulizia, capacità di pompare qualsiasi tipo di gas, e del loro funzionamento senza vibrazioni e necessità di manutenzione.

Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Informazioni dettagliate sono fornite nell'appendice “Technical information”.

Questo manuale utilizza le seguenti convenzioni:

AVVERTENZA!

I messaggi di avvertenza attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.

ATTENZIONE! I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

NOTA Le note contengono informazioni importanti estrapolate dal testo.

Preparazione per l'installazione

La pompa viene fornita in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere la pompa e a non sottoporla ad urti o vibrazioni.

Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

ATTENZIONE! Onde evitare problemi di degassamento, non toccare con le mani nude i componenti destinati ad essere esposti al vuoto. Utilizzare sempre i guanti o altra protezione adeguata.

NOTA La pompa non può essere danneggiata rimanendo semplice-mente esposta all'atmosfera. Si consiglia comunque di mante-nerla chiusa fino al momento dell'installazione sul sistema onde evitare eventuale inquinamento da polvere.

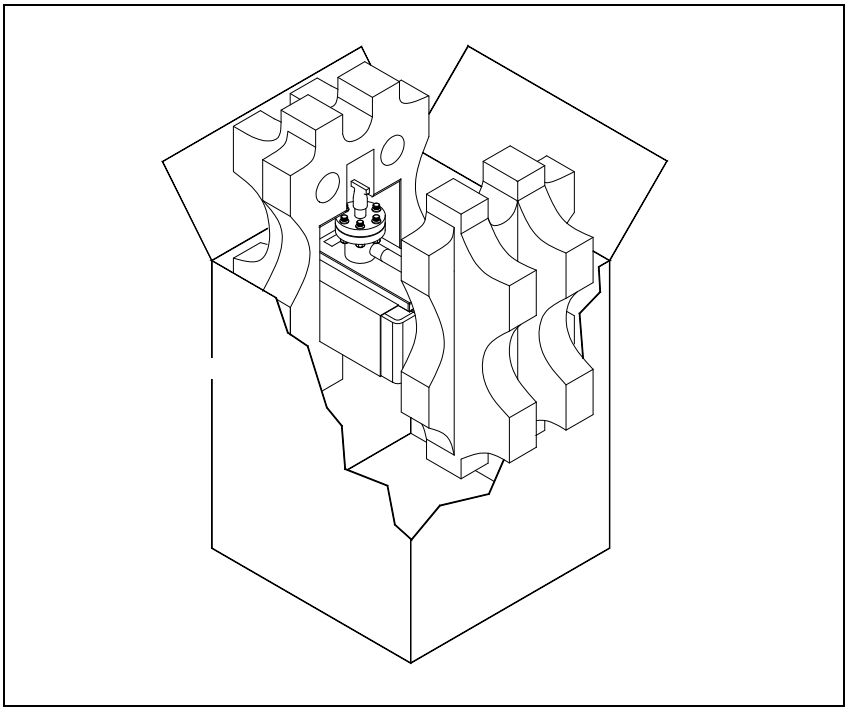


Figura 1

Installazione

Non installare e/o utilizzare la pompa in ambienti esposti ad agenti atmosferici (pioggia, gelo, neve), polveri, gas aggressivi, in ambienti esplosivi o con elevato rischio di incendio. Durante il funzionamento, per ottenere le specifiche tecniche dichiarate, la temperatura ambiente deve essere compresa tra 0 °C e +85 °C.

ATTENZIONE! La pompa deve essere tenuta sigillata con il suo tubo di ingresso schiacciato finchè non è pronta per essere collegata al sistema.

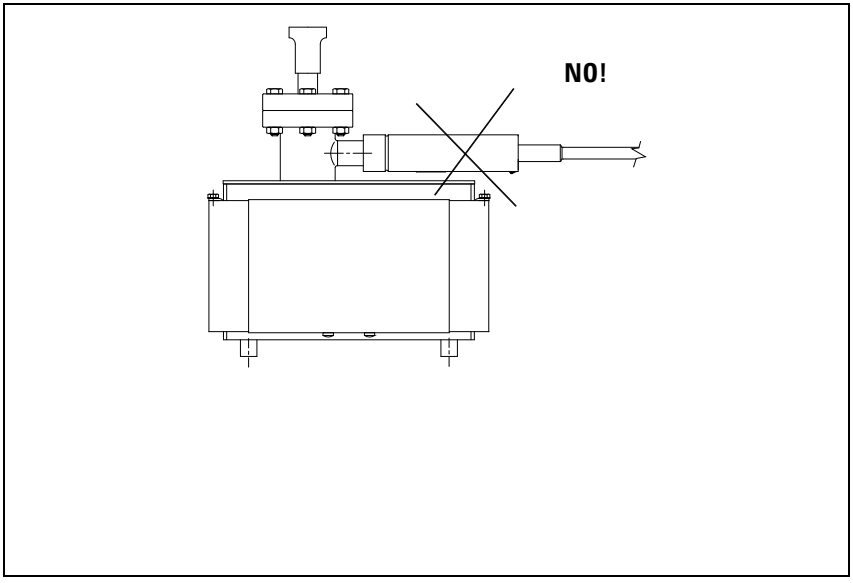


Figura 2

AVVERTENZA! **Per evitare lesioni alla persona, non collegare l'alta tensione alla pompa prima che sia installata nel sistema e che tutte le flange di ingresso siano adeguatamente collegate o chiuse.**

Il funzionamento delle pompe è ottimizzato solo con l'uso delle apposite unità di controllo Agilent (Dual, MidiVac o MiniVac).

ATTENZIONE! Il rispetto delle normative di sicurezza nell'uso delle pompe è garantito solo con l'uso delle unità di controllo Agilent.

La pompa Vaclon Plus può essere installata in qualsiasi posizione. Per convenienza normalmente viene montata in posizione verticale con la flangia di ingresso in alto, o in posizione orizzontale.

Le pompe possono anche essere mantenute sospese in ogni posizione tramite la loro flangia di ingresso.

Per informazioni dettagliate sull'installazione della pompa, vedere l'appendice "Technical Information".

Uso

Tutte le istruzioni per il corretto funzionamento delle pompe Vaclon Plus sono contenute nel manuale dell'unità di controllo.

Leggere attentamente tale manuale prima dell'utilizzo.

Si raccomanda di portare la pompa ad una pressione di $1x10^{-3}$ Torr (mbar) in modo da ottenere un avvio più rapido. A questo scopo è meglio non utilizzare una pompa meccanica sigillata con olio, ma se deve essere utilizzata una tale pompa, si raccomanda di inserire una trappola lungo la linea di vuoto per ridurre la pressione causata dai vapori di acqua e di olio provenienti dalla pompa meccanica. Cercare di ridurre al minimo il tempo in cui la pompa meccanica è aperta verso il sistema e verso la pompa ionica, poiché i suoi vapori si diffondono nel sistema a pressioni inferiori a $1x10^{-1}$ Torr (mbar) causando una contaminazione dello stesso. Nei sistemi in cui l'olio deve essere completamente assente, è meglio utilizzare pompe Turbo per la suddetta operazione.

Depositi igroscopici e l'assorbimento dell'idrogeno all'interno del composto di titanio possono provocare l'allungamento del tempo di avvio con l'invecchiamento della pompa. Durante l'esposizione all'aria, il deposito del composto di titanio assorbe vapore acqueo; in conseguenza di ciò, al successivo avvio, il riscaldamento della pompa provoca il rilascio del vapore e di parte dell'idrogeno pompato precedentemente, con l'effetto dell'allungamento del tempo di avvio.

Procedure di uso

Controllare che la polarità dell'unità di controllo sia corretta per la pompa.

Fare riferimento al relativo manuale ed osservare la seguente procedura per l'uso della pompa:

1. Tramite una pompa di pre-vuoto portare il sistema ad una pressione di $1x10^{-3}$ Torr (mbar) od inferiore.
2. Collegare l'unità di controllo ad una apposita fonte di alimentazione ed accenderla.
3. Osservare la tensione, la corrente e la pressione. Se l'avvio è avvenuto ad una pressione di $1x10^{-3}$ Torr (mbar), è tipica una tensione di circa 300 - 400 V. Un valore di corrente prossimo alla corrente di corto circuito dell'unità di controllo è indice dell'esistenza di una perdita nella pompa e nel sistema. Un temporaneo incremento della pressione di pre-vuoto è normale durante la fase di avvio.
4. Lasciare la valvola di pre-vuoto aperta durante l'avvio della pompa ionica finchè non si raggiunge una adeguata pressione di avvio. Se la tensione della pompa ionica scende dopo la chiusura della valvola, riaprirla per un pre-pompaggio aggiuntivo. Appena la pressione diminuisce, la tensione cresce nuovamente e la valvola di pre-vuoto deve essere chiusa.
5. Quando la tensione ha raggiunto i 2 - 3kV, mettere l'unità di controllo nello stato PROTECT. Il sistema sarà così autoprotetto dall'incremento della pressione oltre $1x10^{-4}$ Torr (mbar) quando la pompa non è controllata. Nel caso in cui ci fosse un tale incremento, l'unità di controllo viene spenta automaticamente.
6. La pressione nella pompa può anche essere calcolata leggendo la corrente e convertendo la lettura in pressione tramite l'apposito diagramma pressione-corrente illustrato nell'appendice "Technical Information" di questo manuale.

NOTA I gradini nel diagramma sono una caratteristica del modo di funzionamento del Dual. Quando la corrente assorbita dalla pompa raggiunge determinati valori, l'unità di controllo cambia il valore dell'alta tensione in uscita.

7 Quando si porta la pompa alla pressione atmosferica, usare azoto secco in modo da evitare l'assorbimento di vapore acqueo da parte delle pareti della pompa.

AVVERTENZA!

Quando la pompa viene utilizzata per il pompaggio di gas tossici, infiammabili o radioattivi, seguire le appropriate procedure tipiche di ciascun gas. Non usare la pompa in presenza di gas esplosivi.

AVVERTENZA!

Non toccare la pompa durante le operazioni di riscaldamento e di raffreddamento. L'elevata temperatura può causare lesioni alle persone.

ATTENZIONE! Non avvicinare dispositivi elettronici alla pompa. Il campo magnetico attorno ad essa può provocare dei malfunzionamenti dei dispositivi stessi.

Manutenzione

Le pompe della serie Vaclon Plus non richiedono alcuna manutenzione. Qualsiasi intervento deve essere eseguito da personale autorizzato.

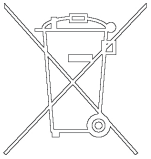
AVVERTENZA! **Prima di effettuare qualsiasi intervento sulla pompa scollegarla dall'alta tensione.**

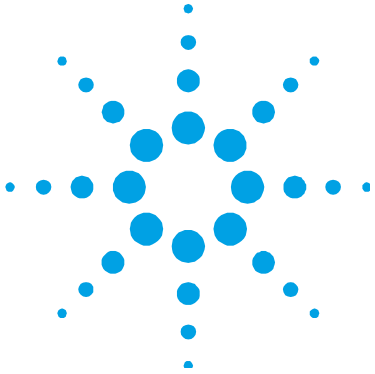
Qualora una pompa dovesse essere rottamata, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

Smaltimento

Significato del logo "WEEE" presente sulle etichette. Il simbolo qui sotto riportato è applicato in ottemperanza alla direttiva CE denominata "WEEE".

Questo simbolo **(valido solo per i paesi della Comunità Europea)** indica che il prodotto sul quale è applicato, NON deve essere smaltito insieme ai comuni rifiuti domestici o industriali, ma deve essere avviato ad un sistema di raccolta differenziata. Si invita pertanto l'utente finale a contattare il fornitore del dispositivo, sia esso la casa madre o un rivenditore, per avviare il processo di raccolta e smaltimento, dopo opportuna verifica dei termini e condizioni contrattuali di vendita.





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Anleitung zur Installation

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Übersetzung der Originalanleitungen

Allgemeine Hinweise

Dieses Gerät ist für den professionellen Gebrauch bestimmt. Vor dem Gebrauch soll der Benutzer dieses Handbuch sowie alle weiteren von Agilent mitgelieferten Zusatzdokumentationen genau lesen. Bei vollständiger bzw. teilweiser Nichtbeachtung der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Mißachtung der nationalen Bestimmungen übernimmt Firma Agilent keinerlei Haftung.

Die Pumpen der Serie Vaclon Plus sind Ionenpumpen, die aufgrund ihrer Reinheit, ihrer Fähigkeit, alle Arten von Gas zu pumpen, und ihres vibrations- und wartungsfreien Betriebes, allgemein für Ultrahochvakuumanwendungen zum Einsatz kommen.

In den folgenden Abschnitten sind alle erforderlichen Informationen für die Sicherheit des Bedieners bei der Anwendung des Geräts aufgeführt. Detaillierte technische Informationen sind im Anhang "Technical Information" enthalten.

In dieser Gebrauchsanleitung werden Sicherheitshinweise folgendermaßen hervorgehoben:

WARNUNG!

Die Warnhinweise richten die Aufmerksamkeit des Bedieners auf eine spezielle Prozedur oder Praktik, die bei unkorrekter Ausführung schwere Personenschäden zur Folge haben könnte.

VORSICHT! Die Vorsichtshinweise vor bestimmten Prozeduren machen den Bediener darauf aufmerksam, daß bei Nichteinhaltung Schäden am Gerät entstehen können.

HINWEIS Die Hinweise enthalten wichtige Informationen, die aus dem Text hervorgehoben werden.

Vor der Installation

Die Pumpe wird in einer speziellen Schutzverpackung geliefert. Eventuelle Transportschäden sind der zuständigen örtlichen Verkaufsstelle zu melden.

Beim Auspacken vorsichtig vorgehen, damit die Pumpe nicht fällt oder Stößen oder Vibrationen ausgesetzt wird.

Das Verpackungsmaterial ist ordnungsgemäß zu entsorgen. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für den Umweltschutz.

VORSICHT! Um Entgasungsprobleme zu vermeiden, dürfen die Komponenten, die mit dem Vakuum in Kontakt kommen, nicht mit bloßen Händen berührt werden. Stets Handschuhe oder einen anderen geeigneten Schutz tragen.

HINWEIS Die Pumpe kann, wenn sie einfach der Atmosphäre ausgesetzt ist, nicht beschädigt werden. Sie sollte jedoch bis zur Installation an der Anlage geschlossen bleiben, um Verunreinigungen durch Staub zu vermeiden.

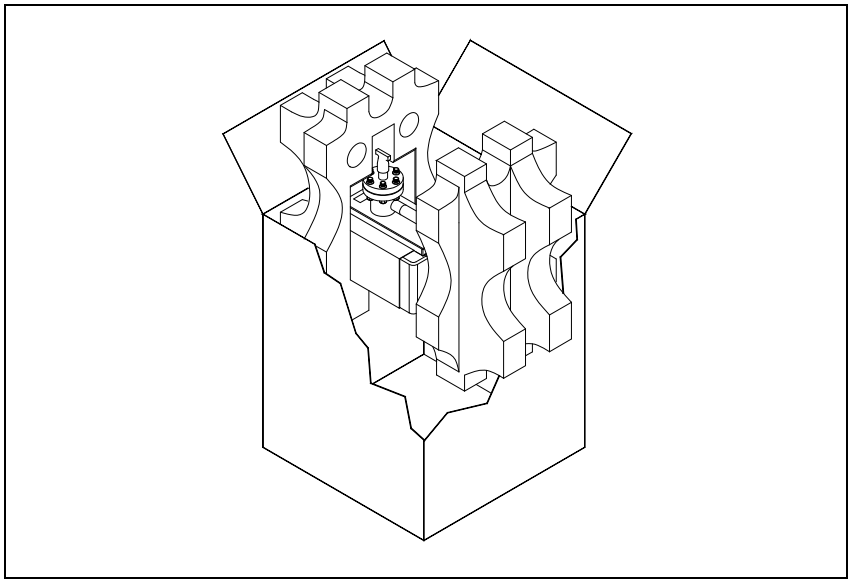


Abbildung 1

Installation

Die Pumpe darf nicht in Umgebungen installiert und/oder benutzt werden, die ungeschützt vor Witterungsbedingungen (Regen, Frost, Schnee), Staub und aggressiven Gasen sind, und in denen Explosions- und erhöhte Brandgefahr besteht.

Während des Betriebes soll die Umgebungstemperatur zwischen 0 °C und +85 °C betragen, um die angegebenen technischen Merkmale zu gewährleisten.

VORSICHT! Die Pumpe soll versiegelt und mit flachgedrücktem Eintrittsschlauch gehalten werden, bis sie für den Anschluß an das System bereit ist.

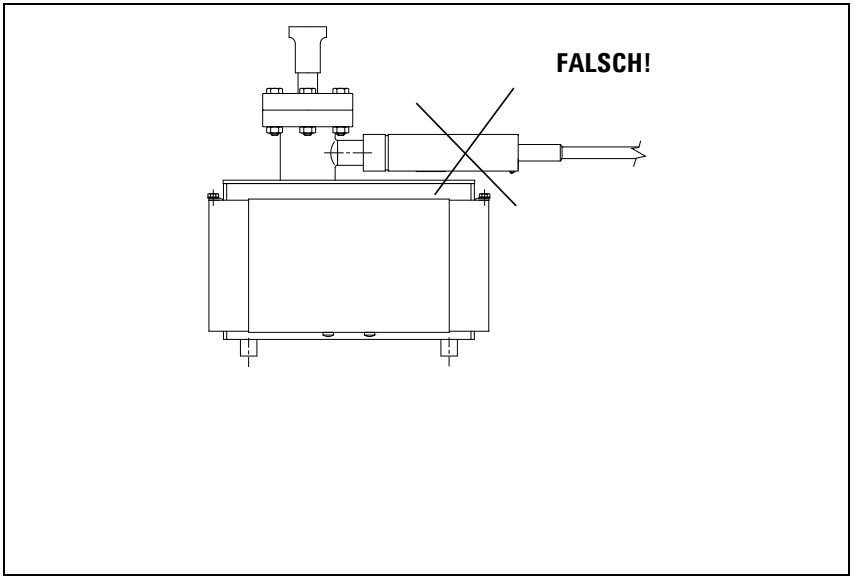


Abbildung 2

WARNUNG!

Um Personenschäden zu vermeiden, darf die Hochspannungsleitung der Pumpe erst angeschlossen werden, wenn die Pumpe im System installiert ist und alle Eintrittsflansche entsprechend angeschlossen oder geschlossen sind.

Der Pumpenbetrieb wird nur durch den Einsatz speziell dafür vorgesehener Agilent Steuereinheiten (Dual, MidiVac oder MiniVac) optimiert.

VORSICHT! Die Einhaltung der Sicherheitsvorschriften beim Gebrauch der Pumpen ist nur bei Verwendung von Agilent Steuereinheiten gewährleistet.

Die Pumpe Vaclon Plus kann in einer beliebigen Position installiert werden. Aus praktischen Gründen wird sie in der Regel senkrecht mit nach oben gerichtetem Eintrittsflansch oder waagerecht eingebaut.

Die Pumpen können auch in einer beliebigen Position an ihrem Eintrittsflansch hängend eingebaut werden.

Detaillierte Informationen zur Installation der Pumpe sind dem Anhang “Technical Information” zu entnehmen.

Gebrauch

Sämtliche Hinweise für den korrekten Betrieb der Pumpen Vaclon Plus sind im Handbuch der Steuereinheit enthalten. Dieses Handbuch ist vor der Inbetriebnahme genau durchzulesen.

Es wird empfohlen, die Pumpe auf einen Druck von $1x10^{-3}$ Torr (mbar) zu bringen, um einen rascheren Anlauf zu gewährleisten. Zu diesem Zweck empfiehlt es sich, keine ölversiegelte mechanische Pumpe zu verwenden. Falls hingegen eine derartige Pumpe benutzt werden muß, soll an der Vakuumleitung eine Falle eingesetzt werden, um den durch die Wasser- und Öldämpfe aus der mechanischen Pumpe erzeugten Druck zu verringern. Es ist zu versuchen, die Zeit auf ein Mindestmaß zu reduzieren, während der die mechanische Pumpe zum System und zur Ionenpumpe geöffnet ist, da sich ihre Dämpfe bei Drücken unter $1x10^{-1}$ Torr (mbar) im System verbreiten und dessen Verunreinigung verursachen. Bei Systemen, die vollkommen ölfrei sein müssen, erweisen sich für den obengenannten Vorgang Turbopumpen als geeigneter.

Hygroskopische Ablagerungen und die Absorption von Wasserstoff in der Titanverbindung können die Anlaufzeit verlängern und eine kürzere Standzeit der Pumpe verursachen. Die Ablagerungen der Titanverbindungen absorbieren Wasserdampf, wenn sie der Luft ausgesetzt werden. Dadurch bewirkt beim anschließenden Anlaufvorgang die Aufheizung der Pumpe die Abgabe des Dampfes und eines Teils des zuvor gepumpten Wasserstoffs, so daß sich die Anlaufzeit verlängert.

Bedienungsschritte

Es ist zu kontrollieren, daß die Steuereinheit in bezug auf die Pumpe richtig gepolt ist.

Es ist nach dem diesbezüglichen Handbuch vorzugehen, für den Gebrauch der Pumpe sind die folgenden Bedienungsschritte zu beachten:

1. Mittels einer Vorvakuumpumpe das System auf einen Druck von $1x10^{-3}$ Torr (mbar) oder einen niedrigeren Druck bringen.
2. Die Steuereinheit an eine entsprechende Versorgungsquelle anschließen und einschalten.
3. Die Spannung, die Stromstärke und den Druck beobachten. Wenn der Anlauf bei einem Druck von $1x10^{-3}$ Torr (mbar) erfolgt ist, ist eine Spannung von ca. 300 – 400 V typisch. Ein Stromwert, der sich dem Kurzschlußstromwert der Steuereinheit annähert, weist auf eine Leckstelle an der Pumpe und am System hin. Ein zeitweiliger Anstieg des Vorvakuumdruckes ist während der Anlaufphase nor-mal.
4. Während des Anlaufes der Ionenpumpe soll das Vorvakuumventil geöffnet bleiben, bis ein angemessener Anlaufdruck erreicht ist. Wenn die Spannung der Ionenpumpe nach Schließung des Ventils abfällt, ist das Ventil für eine zusätzliche Vorvakuumpumpung zu öffnen. Sobald der Druck sinkt, steigt die Spannung erneut an und ist das Vorvakuumventil zu schließen.
5. Wenn die Spannung 2 – 3 kV erreicht hat, ist die Steuereinheit auf den Status PROTECT zu schalten. Das System verfügt auf diese Weise über einen Selbstschutz vor einem Druckanstieg über $1x10^{-4}$ Torr (mbar), wenn die Pumpe nicht kontrolliert ist. Falls ein solcher Anstieg stattfindet, wird die Steuereinheit automatisch ausgeschaltet.
6. Der Pumpendruck kann auch berechnet werden, indem die Stromstärke abgelesen wird und der abgelesene Wert mittels des Druck-Stromstärke-Diagramms im Anhang “Technical Information” des vorliegenden Handbuches in einen Druckwert umgerechnet wird.

HINWEIS Die Stufen im Diagramm sind eine Charakteristik der Arbeits-weise der Pumpe Dual. Wenn der von der Pumpe Dual aufgenommene Strom bestimmte Werte erreicht, ändert die Steuereinheit den Ausgangswert der Hochspannung.

7 Wenn die Pumpe auf den atmosphärischen Druck gebracht wird, ist trockener Stickstoff zu verwenden, um die Aufnahme von Wasserdampf durch die Pumpenwände zu verhindern.

WARNUNG!

Wenn die Pumpe zur Förderung von giftigen, leicht entflammbaren oder radioaktiven Gasen benutzt wird, sind die für das jeweilige Gas vorgeschriebenen Vorgänge zu befolgen. Die Pumpe nie bei Vorhandensein von explosivem Gas benutzen.

WARNUNG!

Darf die Pumpe während der Aufheizung und Abkühlung nicht berührt werden. Die hohe Temperatur kann zu Personenschäden führen.

VORSICHT! Keine elektronischen Geräte in die Nähe der Pumpe bringen. Das darum befindliche Magnetfeld kann zu Funktionsstörungen der Geräte führen.

Wartung

Die Pumpen der Serie Vaclon Plus erfordern keine Wartung. Sämtliche Eingriffe dürfen nur von autorisiertem Personal vorgenommen werden.

WARNUNG! **Vor Eingriffen an der Pumpe ist diese von der Hochspan-nungsquelle zu trennen.**

Bei eventueller Verschrottung einer Pumpe ist diese entsprechend der einschlägigen nationalen Vorschriften zu entsorgen.

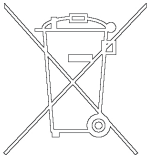
Entsorgung

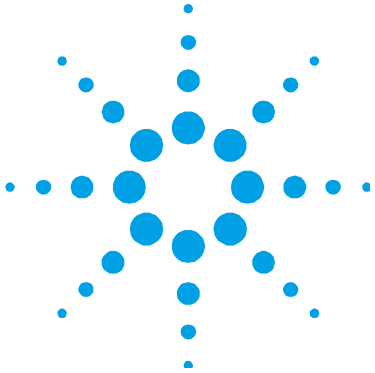
Bedeutung des "WEEE" Logos auf den Etiketten.

Das folgende Symbol ist in Übereinstimmung mit der EU Richtlinie WEEE (Schrott von elektrischen und elektronischen Geräten) angebracht.

Das nur in EU-Ländern gültige Symbol zeigt an, dass das betreffende Produkt NICHT zusammen mit normalem Haushalts- und Industriemüll entsorgt werden darf, sondern einem differenzierten Entsorgungssystem zugeführt werden muss.

Der Endabnehmer sollte daher den Lieferanten des Geräts - die Muttergesellschaft oder den Wieder-verkäufer – kontaktieren, um die Abholung und Entsorgung nach Prüfen der Vertrags- und Verkaufsbedingungen einzuleiten.





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Traduction de la mode d’emploi originale

Indications Generales

Cet appareillage a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice d'instructions ainsi que toute autre indication supplémentaire fournie par Agilent avant d'utiliser l'appareil. Agilent décline toute responsabilité en cas de non respect total ou partiel des instructions fournies, d'opérations non autorisées, d'utilisation impropre par du personnel non formé ou contraires aux réglementations nationales spécifiques.

Grâce à leur propreté, à leur capacité de pomper tous les types de gaz, à leur fonctionnement sans vibrations et à l'absence d'entretien, les pompes de la série Vaclon Plus sont des pompes ioniques généralement utilisées pour des applications de vide ultra poussé.

Les paragraphes suivants fournissent toutes les indications nécessaires à garantir la sécurité de l'opérateur pendant l'utilisation de l'appareillage. Des renseignements plus détaillés se trouvent dans l'appendice "Technical Information".

Cette notice utilise les signes conventionnels suivants:

AVERTISSEMENT!

Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une manœuvre spéciale dont la mauvaise exécution risque de provoquer de graves lésions.

ATTENTION! Les messages d'attention apparaissent avant certaines procédures dont le non-respect peut endommager sérieusement l'appareillage.

NOTE Les notes contiennent des renseignements importants, extrapolés du texte.

Préparation pour l'installation

La pompe est fournie dans un emballage de protection spécial; si l'on constate des signes d'endommagement imputables au transport, contacter aussitôt le revendeur local.

Pendant l'opération de déballage, veiller tout particulièrement à ne pas laisser tomber la pompe et à ne lui faire subir aucun choc ni aucune vibration.

Ne pas abandonner l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme à la directive CEE 85/399 en matière de protection de l'environnement.

ATTENTION! En vue d'éviter tout problème de dégazage, ne pas toucher à mains nues les éléments devant être exposés au vide. Mettre toujours des gants ou toute autre protection appropriée.

NOTE La pompe ne peut être endommagée si elle reste simplement exposée à l'atmosphère. Il est quoi qu'il en soit conseillé de ne pas la retirer de son emballage avant le moment de l'installa-tion, afin d'éviter toute pollution due à la poussière.

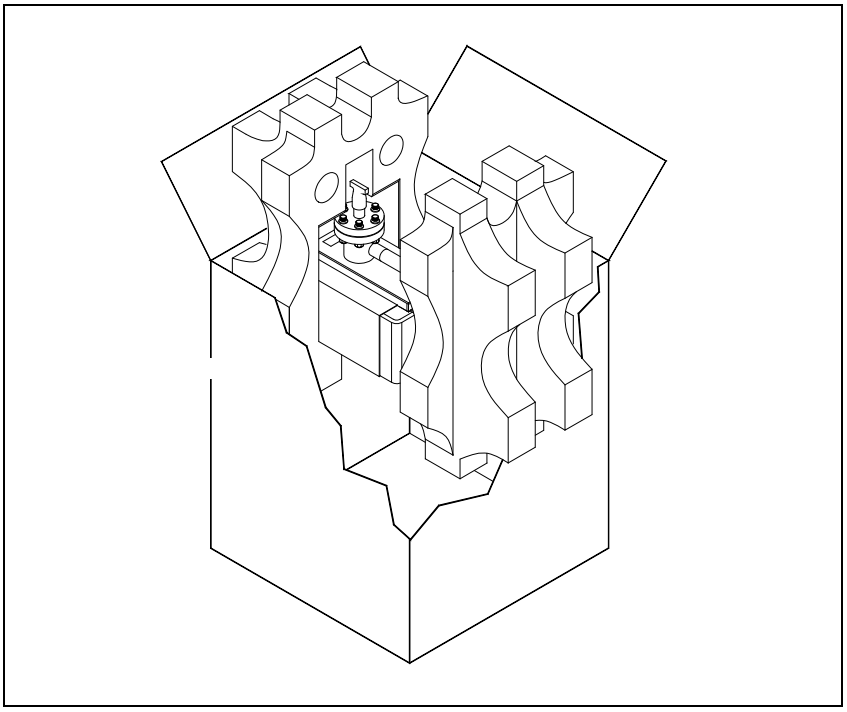


Figure 1

Installation

Ne pas installer et/ou utiliser la pompe dans des milieux exposés à des agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz de combat ainsi que dans des milieux explosifs ou à fort risque d'incendie. Pendant le fonctionnement, pour respecter les spécifications techniques déclarées la température ambiante doit être comprise entre 0 °C et +85 °C;

ATTENTION! La pompe doit être conservée scellée avec son tuyan d'entrée aplati jusqu'à ce qu'elle soit prête à être branchée au système.

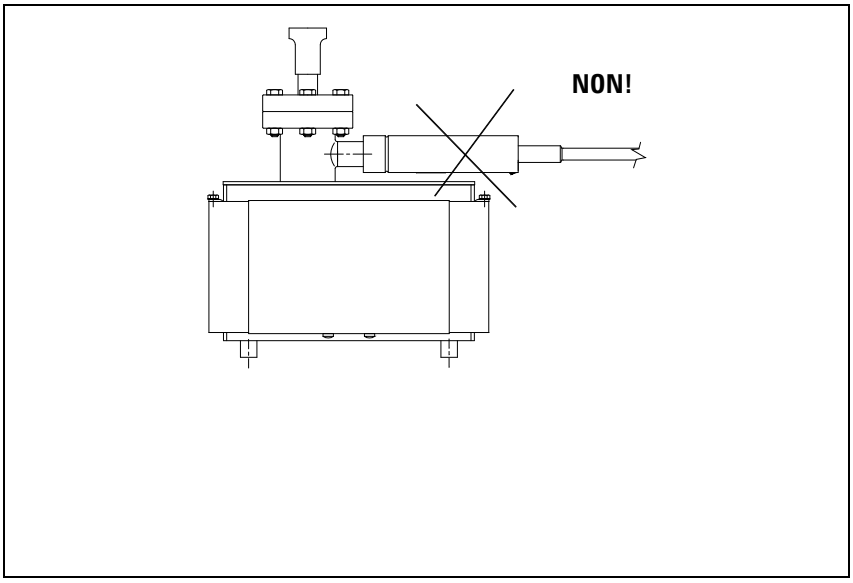


Figure 2

AVERTISSEMENT! **Pour éviter toute lésion aux personnes, ne pas brancher la haute tension à la pompe avant que celle-ci soit installée dans le système et avant que toutes les brides d'entrées soient correctement assemblées ou fermées.**

Le fonctionnement de la pompe n'est optimisé que si celle-ci est utilisée avec l'une des unités de contrôle Agilent spécifiques (Dual, MidiVac ou MiniVac).

ATTENTION! Lors de l'utilisation des pompes, le respect des normes de sécurité est impérativement subordonné à l'emploi des unités de contrôle Agilent.

La pompe Vaclon Plus peut être installée dans toutes les positions. Par facilité elle est généralement montée en position verticale avec bride d'entrée en partie haute, ou en position horizontale.

Les pompes peuvent également être suspendues dans toutes les positions à l'aide de leur bride d'entrée.

Pour plus de détails sur l'installation de la pompe, consulter l'appendice "Technical Information".

Utilisation

Toutes les instructions pour le fonctionnement correct de la pompe Vaclon Plus sont fournies dans la notice de l'unité de contrôle.

Il est conseillé de lire attentivement cette notice avant d'utiliser la pompe.

Il est recommandé de porter la pompe à une pression de $1x10^{-3}$ Torrs (mbars) de façon à obtenir un démarrage plus rapide. Pour ce faire il est préférable de ne pas utiliser une pompe mécanique scellée à l'huile mais au cas où il serait nécessaire d'utiliser une telle pompe, il est recommandé d'introduire un dispositif de retenue le long de la ligne de vide afin de réduire la pression due aux vapeurs d'eau et d'huile engendrées par la pompe mécanique. Essayer de réduire au minimum le temps où la pompe mécanique est ouverte vers le système et vers la pompe ionique car ses vapeurs se répandent dans le système à des pressions inférieures à $1x10^{-1}$ Torrs (mbars) causant une contamination de celui-ci. Dans les systèmes où l'huile doit être complètement absente, il est préférable d'effectuer ladite opération à l'aide d'une pompe Turbo.

Des dépôts hygroscopiques et l'absorption d'hydrogène dans le composé de titane peuvent provoquer, par effet du vieillissement de la pompe, l'allongement du temps de démarrage. Pendant l'exposition à l'air, le dépôt du composé de titane absorbe de la vapeur d'eau et cette action a pour conséquence qu'au démarrage suivant le chauffage de la pompe entraînera la dispersion de la vapeur et d'une partie de l'hydrogène pompée précédemment ce qui aura pour effet d'allonger le temps de démarrage.

Procédure d'utilisation

Contrôler que la polarité de l'unité de contrôle soit correcte pour la pompe.

Se reporter au manuel correspondant et observer la procédure suivante pour l'utilisation de la pompe:

1. A l'aide d'une pompe de pré-vide, porter le système à une pression de $1x10^{-3}$ Torrs (mbars) ou inférieure.
2. Brancher l'unité de contrôle à une source d'alimentation appropriée et l'allumer.
3. Contrôler la tension, le courant et la pression. Lorsque la mise en route est effectuée à une pression de $1x10^{-3}$ Torrs (mbars) la tension est généralement d'environ 300 - 400 V. Une valeur de courant proche du courant de court-circuit de l'unité de contrôle révèle l'existence d'une fuite dans la pompe et dans le système. Au cours de la phase de démarrage, un accroissement momentané de la pression de pré-vide est normal.
4. Laisser la soupape de pré-vide ouverte pendant le démarrage de la pompe ionique tant qu'une pression de démarrage appropriée n'a pas été atteinte. Si la tension de la pompe ionique descend après la fermeture de la soupape, la rouvrir pour un pré-pompage supplémentaire. Dès que la pression diminue, la tension remonte et la soupape de pré-vide doit être refermée.
5. Lorsque la tension a atteint 2 - 3 kV, mettre l'unité de contrôle en état de PROTECT. Le système sera ainsi protégé contre toute augmentation de pression au-delà de $1x10^{-4}$ Torrs (mbars) lorsque la pompe n'est pas contrôlée. Si une telle augmentation devait être enregistrée, l'unité de contrôle s'éteindrait automatiquement.
6. La pression de la pompe peut également être calculée en relevant le courant et en convertissant la lecture en pression à l'aide du diagramme pression-courant illustré dans l'appendice "Technical Information" de ce manuel.

NOTE Les paliers du diagramme sont caractéristiques du mode de fonctionnement du Dual. Lorsque le courant absorbé par la pompe atteint des valeurs déterminées, l'unité de contrôle change la valeur de la haute tension en sortie.

7 Lorsque l'on porte la pompe à la pression atmosphérique , utiliser de l'azote sec de façon à éviter que les parois de la pompe n'absorbent de la vapeur aqueuse.

AVERTISSEMENT! **Lorsque la pompe est utilisée pour le pompage de gaz toxiques, inflammables ou radioactifs, suivre les procédures appropriées à chaque gaz. Ne pas utiliser la pompe en présence de gaz explosifs.**

AVERTISSEMENT! **Eviter de toucher la pompe pendant les opérations de chauffage et de refroidissement. La température élevée peut provoquer des brûlures.**

ATTENTION! Ne pas approcher de dispositifs électroniques de la pompe. Le champ magnétique environnant cette dernière peut entraîner des dysfonctionnements desdits dispositifs.

Maintenance

Les pompes de la série Vaclon Plus ne demandent aucun entretien. Toute intervention doit être exécutée par un personnel agréé.

AVERTISSEMENT! **Avant toute intervention sur la pompe, la débrancher de la haute tension.**

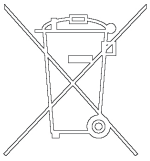
En cas de mise au rebut d'une pompe, procéder à son élimination dans le respect des normes nationales en vigueur.

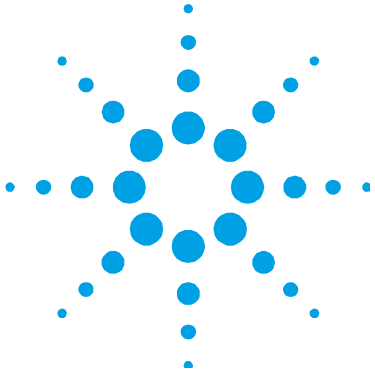
Mise au rebut

Signification du logo "WEEE" imprimé sur les étiquettes. Le symbole indiqué ci-dessous a été appliqué conformément à la directive CE dénommée "WEEE".

Ce symbole (**uniquement valide pour les pays de la Communauté européenne**) indique que le produit sur lequel il est appliqué NE doit PAS être mis au rebut avec les ordures ménagères ou les déchets industriels ordinaires, mais passer par un système de collecte sélective.

Après avoir vérifié les termes et conditions du contrat de vente, l'utilisateur final est donc prié de contacter le fournisseur du dispositif, maison mère ou revendeur, pour mettre en œuvre le processus de collecte et mise au rebut.





4
Installation procedure

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Original Instructions

General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorized interference with the equipment or any action contrary to that provided for by specific national standards.

The Vaclon Plus series pumps are ion pumps commonly used to create ultra-high vacuum, due to their cleanliness, ability to pump different gases, and maintenance- and vibration-free operation.

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

This manual uses the following standard protocol:

WARNING!

The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

CAUTION! The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

NOTE The notes contain important information taken from the text.

Preparation for Installation

The pump is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office.

When unpacking the pump, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it.

Do not dispose of the packing materials in an unauthorized manner. The material is 100% recyclable and complies with EEC Directive 85/399.

CAUTION! In order to prevent outgassing problems, do not use bare hands to handle components which will be exposed to vacuum. Always use gloves or other appropriate protection.

NOTE Normal exposure to the environment cannot damage the pump. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.

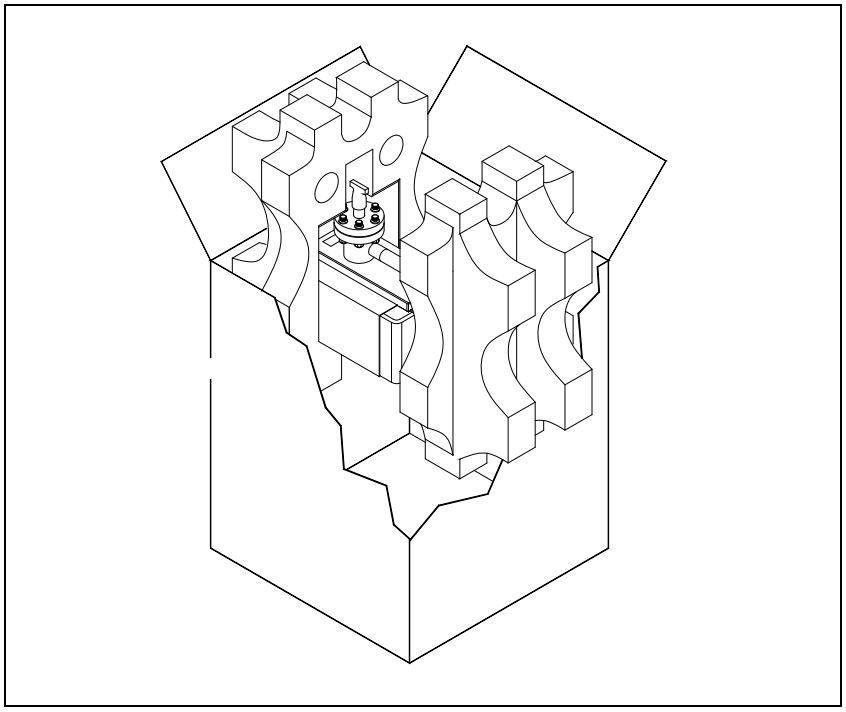


Figure 1

Installation

Do not install or use the pump in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk. During operation, to obtain the declared functioning specification, the ambient temperature must be between 0 °C and +85 °C.

CAUTION! The pump should be kept sealed with its pinch-off tube until it is ready for attachment to the vacuum system.

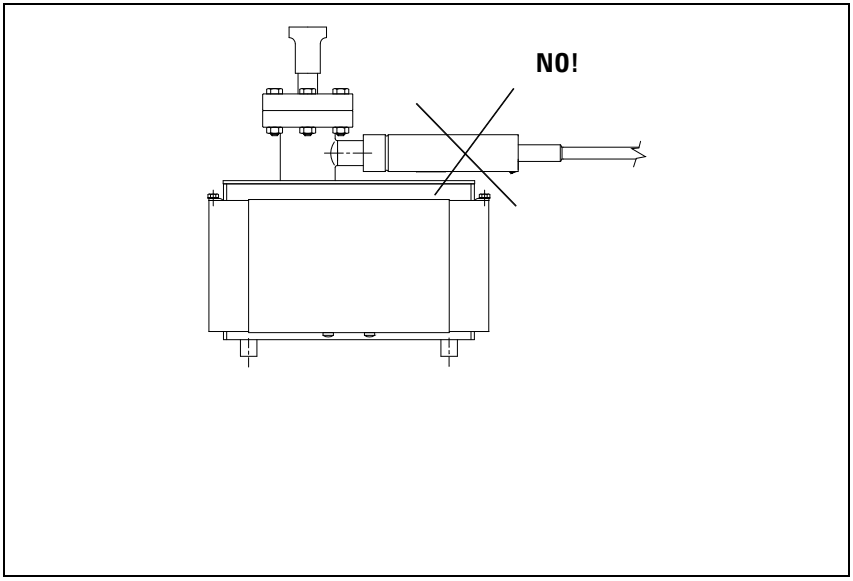


Figure 2

WARNING! **To avoid injury, never connect the high voltage to the pump before it is installed into the system and all the inlet flanges are properly connected or blanked off.**

The pump operation is optimized using one of the special Agilent controllers (Dual, MidiVac or MiniVac) only.

CAUTION! The safety specifications agreement using the pump is guaranteed using the Agilent controller only.

The Vaclon Plus pump can be installed in any position. For convenience, a pump is usually mounted vertically with the inlet up, or placed horizontally.

Pumps can be supported by the mounting flange in any position.

For detailed information about the pump installation, see the appendix “Technical Information”.

Use

All the instructions for the correct use of the Vaclon Plus pumps are contained in the control unit manual.

Read the manual carefully before using the pump.

Rough pumping down to $1x10^{-3}$ Torr (mbar) is recommended for the most rapid starting. Roughing with an oil-sealed mechanical pump is not desirable, but when used, a trap in the roughing line is recommended to reduce pressure due to water vapor and oils from the mechanical pump. Be careful to minimize the time that this pump is open to the system and ion pump, since mechanical pump vapors will start diffusing into the system at pressures below $1x10^{-1}$ Torr (mbar) and cause contamination. In systems where oils must be completely eliminated, turbopump roughing pumps should be used.

Hygroscopic deposits and hydrogen absorption into titanium may cause starting times to increase with age. During exposure to air, the deposits of titanium compound absorb water vapor. In subsequent start ups, pump heating causes release of the water vapor and some previously pumped hydrogen; thus, the starting time may be lengthened.

Operating Procedure

Check that the controller HV polarity is correct for the pump.

Refer to the relevant pump control unit instruction manual and follow the procedure below when operating the pump:

1. With a clean roughing pump, establish a roughing pressure of $1x10^{-3}$ Torr (mbar) or lower in the vacuum system.
2. Plug the control unit into a suitable power source and switch the power ON.
3. Observe the voltage, current, and roughing pressure. If started at $1x10^{-3}$ Torr (mbar), a controller voltage of approximately 300 to 400 volts is typical. A current value near the short-circuit current of the control unit could indicate that an unconfined flow discharge exists in the pump and system. A temporary rise in roughing pressure will usually be noticed during any starting procedure.
4. Allow the roughing valve to remain open after turning on the ion pump until an adequate starting pressure is reached. If the ion pump voltage drops after closing the roughing valves, reopen the valve for additional rough pumping. As the pressure decreases, the voltage again will rise, and the roughing valve should be closed.
5. When the voltage has increased to 2-3 kV, place the control unit in the PROTECT condition. The system is now automatically protected against pressure increases to 10^{-4} Torr (mbar) when the pump is left unattended. If such an increase should occur, the control unit will be turned off automatically.
6. The pressure in the pump can also be determined by reading the current and converting this reading to pressure with the appropriate pressure versus current graph shown in the appendix “Technical Information” of this manual.

NOTE The steps on the charts are characteristic of the Dual step voltage operation. When the current drawn by the Vaclon pump reaches the determinated values, the controller changes the high voltage output.

7 When venting the pump, use dry nitrogen. This will avoid water vapor absorption on the pump walls.

WARNING!

When employing the pump for pumping toxic, flammable, or radioactive gases, please follow the required procedures for each gas disposal. Do not use the pump in the presence of explosive gases.

WARNING!

Do not touch the pump during the heating and cooling phases. The high temperature may cause serious damage.

CAUTION! Do not put any electronic device near the pump since the magnetic field may cause a device malfunctioning.

Maintenance

The Vaclon Plus series pump does not require any mainte-nance. Any work performed on the pump must be carried out by authorized personnel.

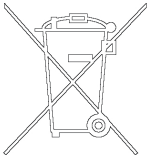
WARNING!

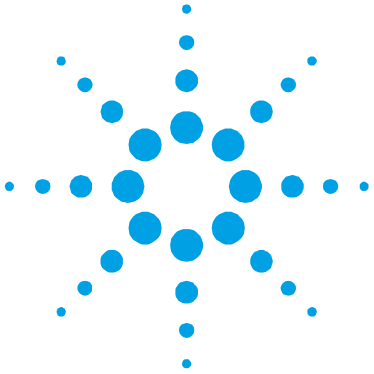
Before carrying out any work on the pump, disconnect it from the High Voltage supply.

If a pump is to be scrapped, it must be disposed of in accordance with the specific national standards.

Disposal

Meaning of the "WEEE" logo found in labels. The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive. This symbol **(valid only in countries of the European Community)** indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system. The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.





5 Technical Information

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Original Instructions

Description of the Vaclon Pump

The Agilent Vaclon Plus 25 pumps are ion pumps and are available in two types:

- Triode
- Diode

They operate in the pressure range from 10^{-2} to be-low 10^{-11} mbar.

The Vaclon Plus Triode pumps allow fast starts from as high as $1x10^{-2}$ mbar, because ions are prevented from bombarding the system and pump walls during glow discharge in the starting pres-sure range, and have higher speed for inert gases. The Vaclon Plus Diode pumps require a lower starting pressure (i.e. 10^{-3} mbar). The Diode contains more titanium than triode pumps, and thus has a higher hydrogen capacity and longer life. A positive polarity high voltage supply is required to operate Diode pumps. A negative polarity high voltage supply is required to operate Triode pumps. The anode is grounded and the cathode is held at negative potential.

The pump can operate in any position and can be supported on the mounting flange. The inlet Con-Flat flange is a 2 3/4" (NW 35 CF).

The following figure shows the Vaclon Plus 25 pump.

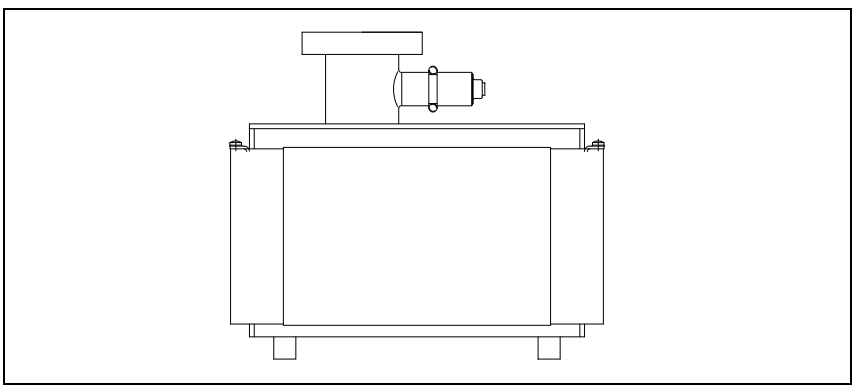

Figure 3 Vaclon Plus 25 pump

Technical Specification

The following table details the main technical specifications of the Vaclon Plus 25 pumps.

Tab. 1

Model Specification	Triode	Diode
Nominal pumping speed for Nitrogen (*) (l/s)	20	24
Operating life at $1x10^{-6}$ mbar (hours)	35,000	50,000
Operating voltage (max)	-5000 Vdc +/- 10 %	+5000 Vdc +/- 10 %
Maximum starting pressure (mbar)	$\leq 1x10^{-2}$	$\leq 1x10^{-3}$
Ultimate pressure	Below 10^{-11} mbar	
Inlet flange	2 3/4" CFF (NW 35) AISI 304 In SST	
Internal volume (litres)	01.4	
Maximum baking temperature (°C)	350	
Temperature limits (°C):		
Pump	400	
Magnet (ferrite)	350	
Flange	500	
Material: Body	AISI 304 SST	
Cathode	Titanium	Titanium
Anode	AISI 304 SST	
Magnet	Ferrite	
Weight, lbs (kg)	Net: 21 (9.5) Shipping: 27 (12)	

(*) Tested according to ISO/DIS 3536/I

The following figures show the pumping speed vs. pressure diagrams for saturated and unsaturated pumps and the pressure vs. current diagrams for the same pump. The diagrams are for pumps con-trolled by means of a Dual controller.

NOTE The steps on the diagrams are characteristic of the Dual step operation: steps occur whenever the cur-rent reaches a value at which the Dual controller high voltage output changes to optimize pump speed.

The pumping speed of a newly regenerated (i.e. baked) sputter ion pump decreases during opera-tion until it reaches a stabilized level known as "saturation" (nominal pumping speed). To saturate the Vaclon Plus 25 pump, it normally requires an amount of gas equal to 1 mbar-liters. Consequent-ly, pumps can operate for extended periods of time at low pressures in the non-saturated state, if they are properly conditioned.

Outline Drawing

The following figure shows the outline drawing for the Vaclon Plus pump.

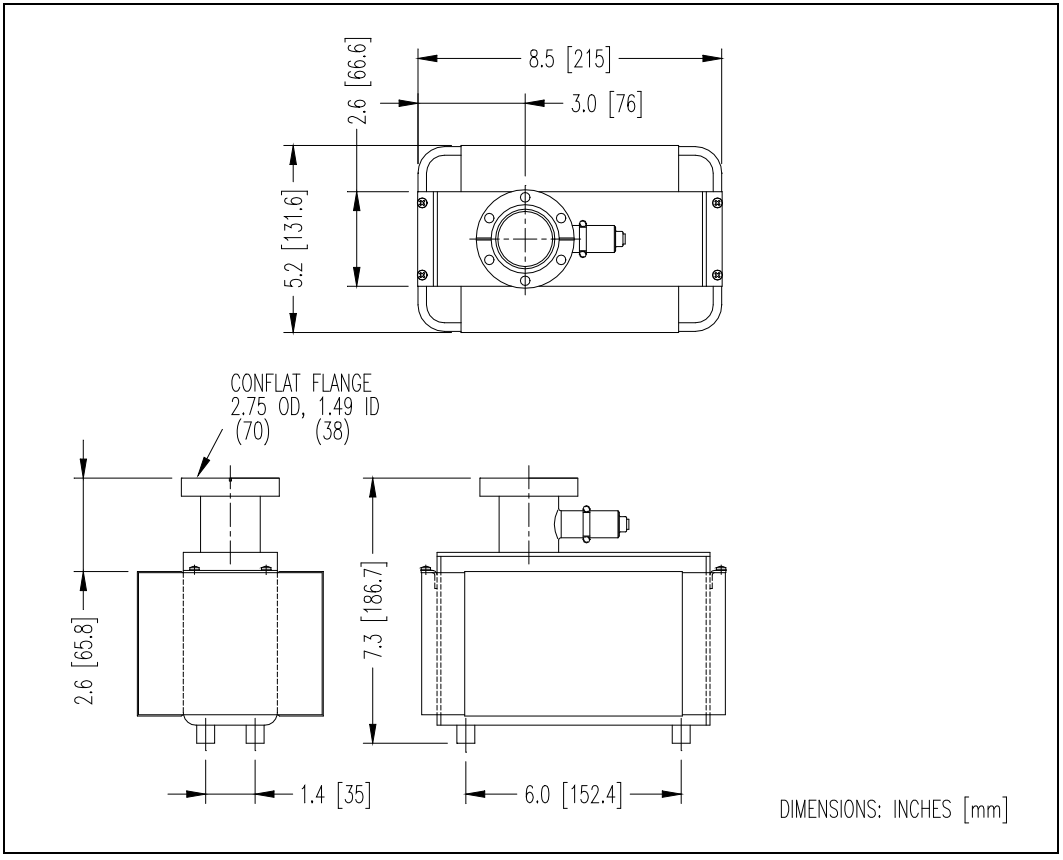

Figure 4 Vaclon Plus pump outline drawing

Stray Magnetic Field

The following magnetic data for the Vaclon Plus 25 pump is presented:

1. Polar plots of field strengths in the plane of the top flange for radii of 5 and 10 inches from the center of the pump.
2. Curves of field strength along the center line of the pump and in the plane of the flange as a function of distance from the pump, as shown on the individual plots.

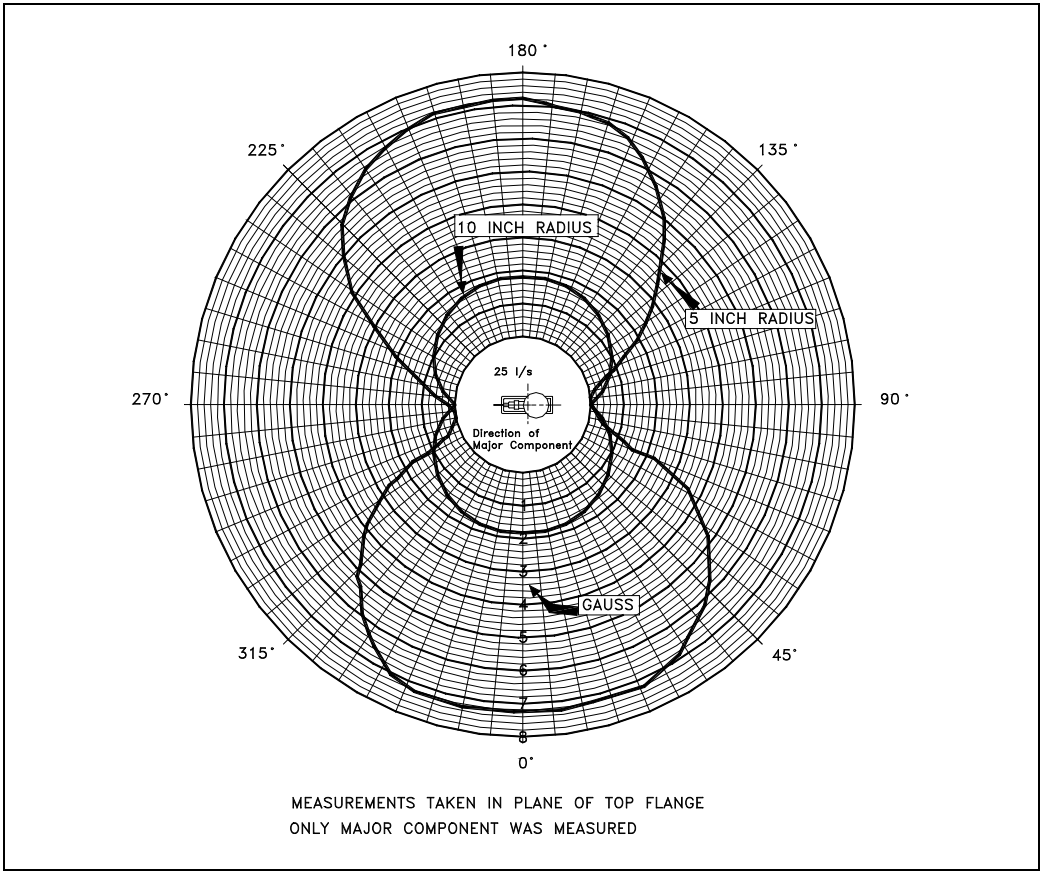

Figure 5 Polar magnetic field

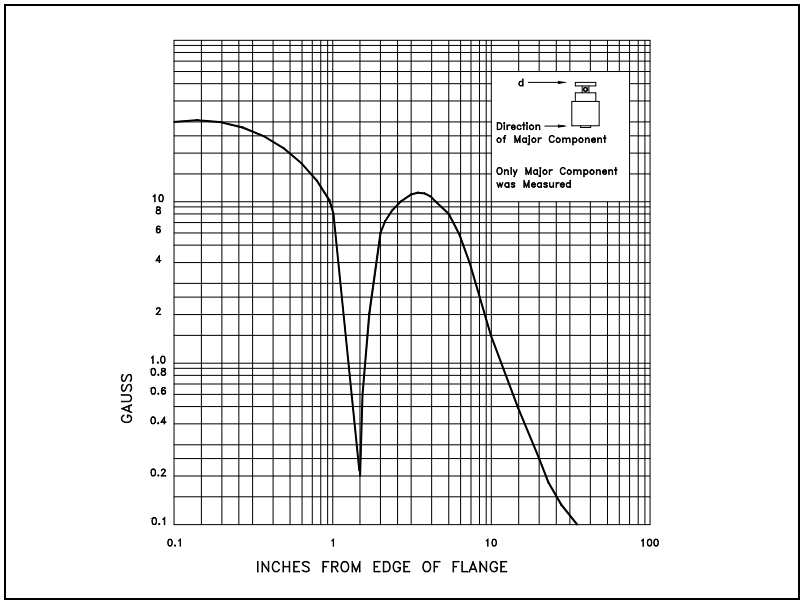

Figure 6 Stray magnetic field from flange (sheet 1 of 3)

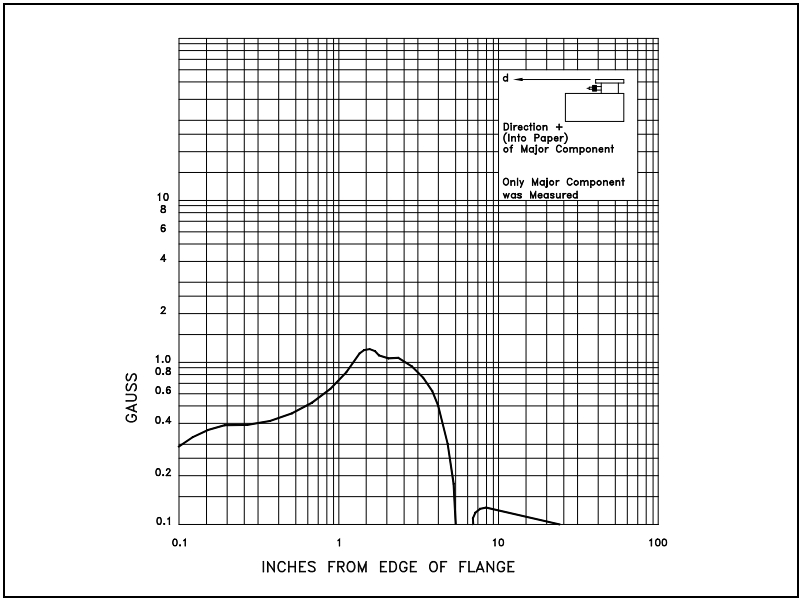

Figure 7 Stray magnetic field from flange (sheet 2 of 3)

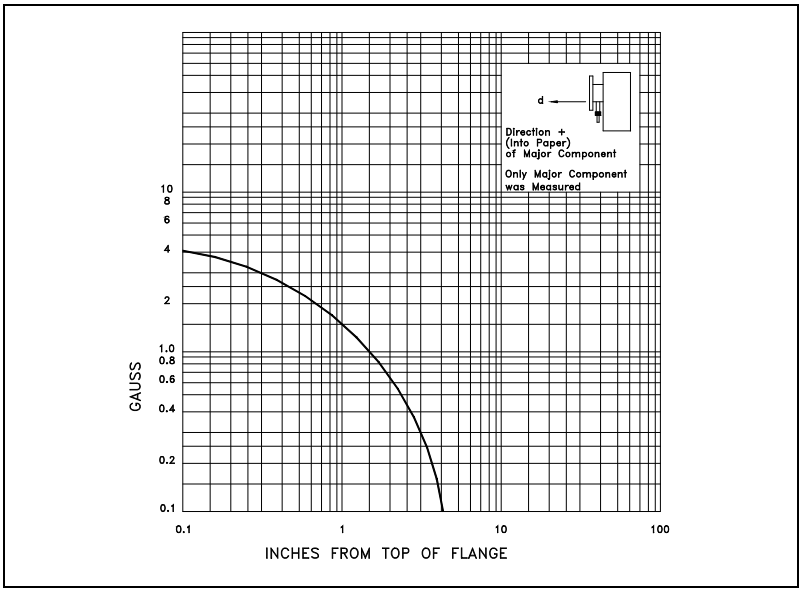

Figure 8 Stray magnetic field from flange (sheet 3 of 3)

Vaclon Plus Pump Installation

Inspection Procedure

Vaclon Plus pumps are evacuated, baked out, sealed, and leak-checked at below $1x10^{-9}$ mbar prior shipping.

The following information and procedures can be used to establish the vacuum integrity of a Vaclon Plus pump before installation.

Visual Inspection

Inspect the pump and magnet for physical damage which may have occurred during shipment. Examine, in particular, the brazed joints on the high voltage feedthrough.

Inspect the pinch-off seal. If it is open, the pump is at atmospheric pressure.

WARNING! **The pinch-off seal is extremely sharp. Be careful.**

A Vaclon Plus pump that has been exposed to atmosphere during shipment, or while in storage, will operate properly if it has otherwise not been damaged.

The pump is not harmed by such exposure, although it is good practice to keep it under vacuum when not in use to exclude dust and the accumulation of water vapor from the environment.

Vacuum Evaluation

To determine the vacuum level of the new pump before air releasing it:

1 Connect the pump to the control unit as directed in the instruction manual of the control unit.

WARNING! **The high voltage which is present in the ion pump when it is powered from the power unit can cause severe injury or death.**

Be sure the garter spring is mounted on the high voltage feed through because the ground connection is brought from the control unit to the pump body through the garter spring. An additional safety ground connection for the pump body is made through the fixing screws of the H.V. cable connector.

---

2 With the main power switch in the OFF position, plug the control unit into a suitable power source.

3 Turn the power to ON.

4 Observe the reading for an indication of one of the following conditions:

- **a** If the pump is free of leaks and is at a low pressure, the pressure indication shall quickly fall to or below the 10-8 mbar range as the volume of gas is pumped.
- **b** If the pressure inside the pump is at or near atmospheric level, an arc may strike inside the high voltage feedthrough giving a popping sound and the pump current will fluctuate. If this occurs, turn the power OFF immediately.

5 If the vacuum integrity has been lost, the pump should be leak-checked with a mass spectrometer leak detector before installation on the system.

Short Circuits

If there is a short circuit between the anode and cathodes in the pump, the short-circuit current of the control unit will be drawn and zero voltage will be indicated. If a short circuit exists in the control unit or high voltage cable and connector, zero voltage will also be observed when the high voltage connector is disconnected from the pump (refer to the control unit manuals).

Typical Installation

A typical installation is shown in the following figure and consists of:

1. Vaclon Plus pump.
2. A Valve to seal off the pump from the rest of the system (if required).
3. The control unit.
4. A clean roughing pump (i.e. oil-free turbo).
5. A thermocouple gauge capable of indicating pressure from atmosphere to 10^{-3} mbar range.
6. A valve to seal off the roughing pump from the vacuum chamber. Roughing lines, are usually made of stainless steel or copper tubing, or other low vapor pressure material.
7. High voltage cable.
8. Backing pump.

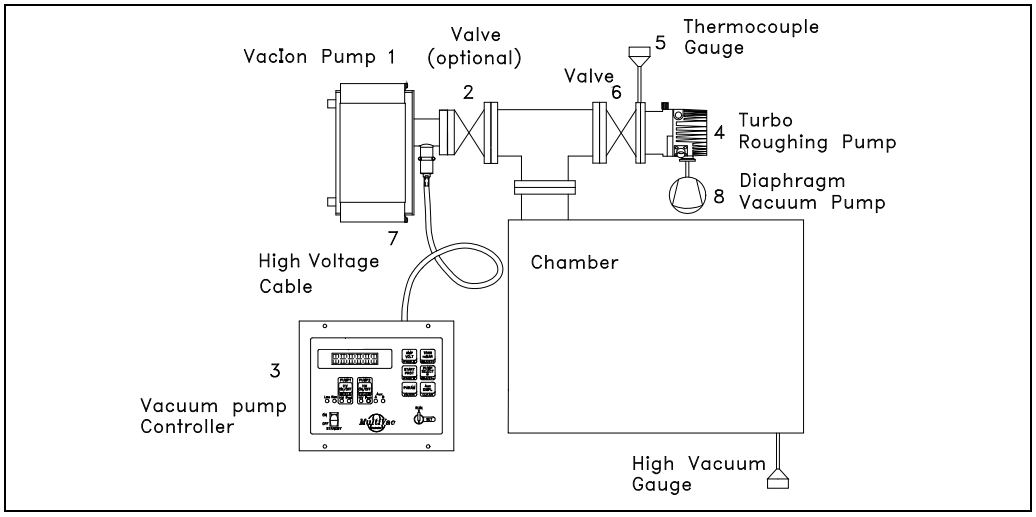

Figure 9 Typical installation

Inlet Flange Connection

The Vaclon pump can be installed with any orienta-tion, but should be mounted to fulfill two require-ments.

First, a minimum of clearance is necessary for the removal of the high voltage connector.

Second, the effect of the pump's fringing magnetic field should be considered (see para. "STRAY MAGNETIC FIELD").

To avoid accumulation of dust and other particles or foreign material, the pump should be kept sealed with its pinch-off tubulation until it is ready for attachment to the vacuum system.

CAUTION! Do not open the pinch off-seal with a saw or grinder. These methods will cause metal particles to be drawn into the pump by the inrushing air as the pump is opened.

When ready to install the pump, release the internal vacuum by using pliers to open the copper tube pinch-off.

WARNING! **The pinch-off seal is extremely sharp. Be careful when opening. Watch your fingers.**

Unscrew the main flange bolts and lift the blank flange with the help of a bolt screwed into the available threaded hole. Remove the ConFlat flange and the copper gasket plate. Some par-ticles of copper oxide may adhere to the outer edge of the flange gasket. Be careful not to allow them or any other foreign materials to fall into the pump.

Connect the pump to the vacuum chamber with a short length and large diameter tubulation in order to retain as much as possible the pumping speed of the pump. Proceed as follows:

1 Inspect the mating flanges for cleanliness and absence of scratches on the knife edge.

2 Place a new copper gasket between pump flange and vacuum chamber flange.

3 Bolt mating flanges of the pump to the chamber with the screws provided with the ion pump. For flanges over NW 35 (2.75" o.d.) also mount washers below the nuts and screw heads.

4 Use silver-plated screws or apply high tempera-ture lubricant to the screw threads. Lubrication simplifies sealing and disassembly. A recom-mended lubricant is Fel-Pro C-100.

NOTE Lubrication is essential to prevent galling of the nut and screw after bakeout.

5 Attach the nuts and tighten each one to 6 – 11 Nm (4.5 - 8 ft.-lbs) of torque. After tightening a nut, always tighten the opposite nut with respect to the center of the flange. This will partially close the gap between the flange faces.

6 Repeat the sequential tightening for two more cycles.

7 Continue tightening the bolts until the flange faces meet and a pronounced increase in torque is felt.

Control Unit Connection

WARNING!

The high voltage present in the high voltage cable which connects the control unit to the ion pump, can cause severe injury or death. Before mounting the high voltage connector of the cable on the pump high voltage feedthrough, or before remov-ing it, be sure the main power is removed from the control unit. To avoid injury, never connect the high voltage to the pump before it is installed into the system and all the inlet flanges are properly connected or blanked off.

Connect the control unit to the ion pump with the coaxial high voltage cable assembly as follows:

1. Be sure the garter spring is properly mounted on the pump high voltage feedthrough since the ground connection is made through the garter spring.
2. Push the female end of the cable connector over the high voltage feedthrough.
3. Lock the connector to the feedthrough brackets with the screws mounted on the high voltage connector.
4. Push the male end of the cable connector into the socket on the control unit rear panel. (Refer to the control unit instruction manual).

WARNING!

Before removing the high voltage connector of the cable from the control unit, be sure the main power is removed from the control unit. Wait at least 30 seconds after removing the main power from the control unit, to allow capacitors to discharge completely.

To disconnect the coaxial high voltage cable from the controller, slide the safety locking sleeve (very little sleeve travel is required) from the control unit and at the same time pull on the male end of the cable connector to remove it from the socket on the control unit.

Bakeout Operation

When a Vaclon pump does not reach the desired base pressure, and there are no leaks, it is neces-sary to bake the system to remove water vapour. This is done by heating the pump and all the components in the system.

1. Heat the pump body with a bakeout oven or heating strips to temperatures between 150 °C and 220 °C (220 °C is the maximum allowable for most bakeable high voltage cables). This temperature is high enough to degas the pump surfaces of water vapour without damaging the magnet and high voltage connector. Note that the system components must be compatible with the bakeout temperature. The heating must be approximately even on all vacuum surfaces or water vapour can recondence on the cooler surfaces preventing achievement of UHV vacuum pressures.
2. Leave the pump control unit on and monitor the pressure. It must never increase above $5x10^{-5}$ mbar; if this value is exceeded, turn the bake-out off and then on again when low pressure is restored. To control the heaters and to monitor to high pressure limit during bakeaout in automatic mode, a pressure-sensitive relay may be used.
3. Bake the Vaclon Plus pump for at least eight hours. Longer bakeout periods are recom-mended when the pump has been used with heavy gas load applications or when UHV pres-sure, 10^{-9} mbar range or less is desired.
4. As the pump and system cool down to room temperature, a drop in pressure should be observed.

Pump Speed

Pumping speed varies with pressure and with dif-ferent gases.

Virtually all gases and vapours can be pumped without stopping the pumping action in Vaclon pumps. The sputtering action of the pump re-moves contaminants and continues to provide fresh titanium for pumping. An inert gas load in a vacuum system is typically only "volume gas" - inert gas absorption to surfaces of the system is negligible. Thus, the need for long-term inert gas pumping only occurs when argon or air is introduced continuously into the system or if a large leak exists (argon is 1 % of atmospheric air). Cyclical pumping occurs above 10^{-5} mbar on argon. These pressure variations typically cease when the leak rate of argon is reduced or eliminated.

Maintenance

Vaclon Plus pumps are maintenance free. In case of life time expiry or accidental premature failure of the pump, please contact your nearest Agilent sales/service office for repair.

Leakage Current Check

The current value displayed on the controller is the total of the operating current, and leakage current from controller, cables, feedthrough, and pump insulators.

If the pump current reading is to be used as pressure measurement, check the pump leakage currents as follows:

1. Turn off the pump control unit.
2. Remove the pump magnet.
3. Turn on the pump control unit and wait for current stabilization. The current reading should not be higher than 1 µA. Make sure that the control unit and the high voltage cable leakage current is negligible.

4 If leakage current comes from the pump, perform "high-potting" per the procedure below; then recheck the pump and install the magnet.

5 If it is not possible to "high-pot" the pump, the pressure reading is biased by the leakage current value.

Hi-Potting

A constant pump current when no vacuum leak ex-ists is often caused by field emission currents at the pump cathodes which prevent the use of the pump current as a pressure indicator. To reduce this field emission current, "hi potting" should be performed. "High potting" is the term used to de-scribe the application of higher than normal operating voltage (10-12 KV, 20-50 mA) for the purpose of burning off "whiskers" (sharp edges) on the pump cathode.

The output of an appropriately sized AC transformer (i.e. neon sign type) may be applied to the pump for a period of about 30 seconds. This should effectively remove any "wiskers" or sharp edges on the pump cathode.

WARNING! **Voltages developed in the High Potter power supply are potentially lethal. Use caution during opera-tion and ensure correct grounding connection.**

Pump Troubleshooting

Tab. 2

Symptom	Possible cause	Correction procedure
Slow starting	Starting vacuum pressure too high.	Reduce pressure to 10^{-5} mbar recommended 10^{-3} mbar minimum.
Slow starting (more than 30 minutes).	Air leaks which limit pressure to above 10-6 mbar and cause longer starting time.	Leak check the vacuum system with a helium leak detector.
Slow pump-down due to long exposure of viton parts to air.	Viton releases considerable gas after long exposure to air. (A bell-jar system which reached 2 x 10^{-8} mbar in 24 hours after 30 minutes air exposure, will only reach 1 x 10^{-7} mbar in 24 hours after 20 hours air exposure).	With the system under vacuum, pump for several days, or heat to 100-150 °C for up to 15 hours.
Slow pump-down due to absorption of vapours on pump and system walls.	Vapours and gases admitted to a system are absorbed on the walls of the system and pump. Subsequent reduction in pressure depends on the rate of depletion of this vapour. Heavy hydrocarbons are most troublesome because of their relative low vapour pressure and are very difficult to remove, even by baking.	Bake the system walls, thereby accelerating the desorption process. Baking mobilizes the vapours so they can be cracked and pumped by discharge (see para. “BAKEOUT OPERATION”).
Slow starting or slow pump-down.	High voltage feedthrough is leaking.	Replace the feedthrough.
Current higher than expected at any given pressure.	Ion pump leakage current causing higher pressure reading.	Highpot the pump.
System fails to achieve desired UHV vacuum pressure.	System not fully baked. Water vapor limits base pressure	Bake the system walls, thereby accelerating the desorption process. Baking mobilizes the vapours so they can be cracked and pumped by discharge (see para. “BAKEOUT OPERATION”).
System fails to achieve desired UHV vacuum pressure.	System not appropriately cleaned for UHV. Excessive outgassing from walls limits base pressure.	Clean all components for UHV and bake the system again.

Vaclon Plus Pump Replacement Parts and Accessories

Tab. 3

	PART NUMBER	
	TRIODE	**DIODE**
Basic pump	911-5030	911-5036
Cables		
HV Bakeable cable, 13' (4 m) long	929-0780	
Replacement parts and accessories		
Pump body without magnets	911-5031	911-5036-S007
Magnet assembly	915-0114	
Garter spring	00.601410-01	
Copper gasket for 2 3/4" flange (10-pack, individually sealed)	FG-0275-CI	
Nut and bolt set for 2 3/4" flange, 1/4 – 28 x 1 1/4 (25-pack)	FB-0275-C12	

For a complete overview of Agilent's extensive vacuum product line, please refer to the Agilent Vacuum Catalogue.

Vaclon Plus Pump Controller

The following controller series are available to supply the Vaclon Plus pumps:

- MiniVac
- Dual
- 4UHV

Please refer to the Agilent Vacuum Catalogue to choose the correct controller for each pump.

Agilent Technologies

Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

Giampaolo LEVI

Vice President and General Manager
Agilent Vacuum Products Division

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

FAX N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

NAME	COMPANY	FUNCTION

ADDRESS:

TEL. N° : _____ FAX N° : _____

E-MAIL: _____

PROBLEM / SUGGESTION :

REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):

DATE _____

CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) LOG N° _____

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

Agilent Technologies

Agilent Technologies

Vacuum Products Division
Instructions for returning products

Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.

2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.
Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

3) **Important steps for the shipment of returning product:**
   - Remove all accessories from the core product (e.g. inlet screens, vent valves).
   - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
   - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product.**
   - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
   - Agilent Technologies is not responsible for returning customer provided packaging or containers.
   - **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.

4) Return only products for which the RA was issued.

5) **Product being returned under a RA must be received within 15 business days.**

6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.

7) Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

EUROPE:	**NORTH AMERICA:**	**PACIFIC RIM:**
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com

Agilent Technologies

Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORMATION

Company Name:	**Contact Name:**
Tel: **Email:**	**Fax:**
Customer Ship To:	**Customer Bill To:**
Europe only: **VAT reg. Number:**	USA/Canada only: ☐ **Taxable** ☐ **Non-taxable**

2) PRODUCT IDENTIFICATION

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

3) TYPE OF RETURN (**Choose one from each row** and supply Purchase Order if requesting a billable service)

3A. ☐ Non-Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form):

3B. ☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.
Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

☐ **HAS NOT** pumped or been exposed to any toxic or hazardous materials. OR

☐ **HAS** pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

☐ Toxic ☐ Corrosive ☐ Reactive ☐ Flammable ☐ Explosive ☐ Biological ☐ Radioactive

List all toxic/hazardous materials. Include product name, chemical name, and chemical symbol or formula:

_____

NOTE: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Print Name: **Authorized Signature: .....** **Date:**

5) FAILURE INFORMATION:

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

I understand and agree to the terms of Section 6, Page 3/3.
Print Name: **Authorized Signature: .....** **Date:**

Agilent Technologies

Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please use these Failure Mode to describe the concern about the product on Page 2.

TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTION		POSITION	PARAMETERS	
- Does not start	- Noise	- Vertical	Power:	Rotational Speed:
- Does not spin freely	- Vibrations	-Horizontal	Current:	Inlet Pressure:
- Does not reach full speed	-Leak	-Upside-down	Temp 1:	Foreline Pressure:
- Mechanical Contact	-Overtemperature	-Other:	Temp 2:	Purge flow:
- Cooling defective	-Clogging	.....	OPERATING TIME:	

ION PUMPS/CONTROLLERS

- Bad feedthrough	- Poor vacuum
- Vacuum leak	- High voltage problem
- Error code on display	- Other

VALVES/COMPONENTS

- Main seal leak	- Bellows leak
- Solenoid failure	- Damaged flange
- Damaged sealing area	-Other

LEAK DETECTORS

- Cannot calibrate	-No zero/high backround
- Vacuum system unstable	- Cannot reach test mode
- Failed to start	- Other

INSTRUMENTS

- Gauge tube not working	- Display problem
- Communication failure	- Degas not working
- Error code on display	- Other

SCROLL AND ROTARY VANE PUMPS

- Pump doesn't start	- Noisy pump (describe)
- Doesn't reach vacuum	- Over temperature
- Pump seized	- Other

DIFFUSION PUMPS

- Heater failure	- Electrical problem
- Doesn't reach vacuum	- Cooling coil damage
- Vacuum leak	- Other

Section 6) *ADDITIONAL TERMS*

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

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